CSIR NEWS

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Shri K. C. Pant Takes over as Vice-President, CSIR

Shri K. C. Pant, Minister of State in the Ministry of Home Affairs, and also Minister of State, Departments of Electronics and Scientific & Industrial Research, took over as Vice-President, Council of Scientific & Industrial Research with effect from 2 July 1970.

Born on 10 August 1931 at Bhowali, Naini Tal Dist., Uttar Pradesh, Shri Krishna Chandra Pant had his collegiate education at St Joseph's College, Naini Tal and the University of Lucknow from where he obtained his M.Sc. degree. He was recipient of the Chancellor's Gold Medal for the best student of the year. He pursued higher studies for two years in Germany.

Shri Pant has been intimately associated with the socio-economic problems of the country. He was a delegate to the Seminar on Nuclear Weapons (Toronto, 1966); Indian delegate to the Human Rights Commission (1965) and first Vice-Chairman of the Human Rights Commission (1966). He was also member of the Administrative Reforms Commission's study team on government machinery; and member of the Committee on Public Undertakings.

Shri Pant is widely travelled and has visited USA, USSR, UK, West Germany, Yugoslavia and many West European countries.

Conference of Chairmen of Executive Councils

A conference of the chairmen of the executive councils of the national laboratories and councils of management of the industrial research associations was held in New Delhi on 3 July 1970. Shri K. C. Pant, Minister of Scientific and Industrial Research and Vice-President, CSIR, presided over the meeting.

Some of the important suggestions made at the conference are as follows.

It was recognized that success in applied research lies in the selection of the right problems; problems should be related to the needs of the country and should normally satisfy three basic norms—economic feasibility, compatibility and possibility of solution within a reasonable time target.

There should be intimate involvement of industry in research if the existing credibility gap is to be reduced.

Scientists at the bench should be fully involved in policy making and programme formulations in the laboratories; research laboratories will fail if the working scientist was left dissatisfied and disenchanted. It was felt that the suggestion made by the Vice-President, CSIR, for setting up academic council type of bodies in national laboratories may be a way out.

Efforts and resources get diluted if too many problems are taken up simultaneously. Efforts should be concentrated in solving a few high priority problems properly time targeted. There should be a proper machinery for identification of problems and areas in which concerted efforts need be made and for laying down priorities; once priorities are laid down, adequate funds must be ensured to complete the projects.

Adequate attention should be paid to maintain closer contacts with small scale industries in particular since they can derive the maximum advantage from indigenous know-how.

There was general agreement with regard to the gaps in R&D organizations in the key industries of the country. It was necessary for an R&D base with adequate documentation facilities and a library to be established in the leading industries on the lines of an R&D board to be established for the steel industry; imported technology must be backed by indigenous development work to prevent continuous dependence on foreign know-how.

The need for properly defining the functions, the responsibilities and the accountability of the executive councils was stressed; in this context it was noted that according to the present constitution, no accountability devolves on the executive councils.

Laboratories should be identified with relevant industries; in this context some instances were mentioned. It was noted that this problem was not very much in existence in the research associations.

After the establishment of bench scale results in a research laboratory, large scale trials should be undertaken in the industry concerned, with financial participation.

While attempts have been made to bring in collaboration between research and industry, it was noted that there was no provision in the CSIR's present set-up to ensure the collaboration of economists simultaneously. It was agreed that scientists were not in a position to undertake techno-economic evaluation by themselves and that it was important to associate economic experts also in the identification of projects.

The importance of documentation in R&D organization was emphasized; it was also pointed out that while there has been a huge mass of documentation in Insdoc, New Delhi, it is the evaluation of this documentation which was wanting; this could be undertaken by scientists themselves since Insdoc does not have the facilities to do so.

A point was made that in the overall interest of the country's industrial development, the government should take a policy decision to the effect that: (i) indigenous know-how will be encouraged; and (ii) industrial licences will not be refused for units based on indigenous know-how on the ground that no capacity is available.

The movement of scientists between national laboratories and universities was considered necessary. This required funds for which there was no provision in the University Grants Commission's budget at present. This aspect needed to be looked into.

Import of technology and the advisability of re-discovering known processes was discussed. Japan's methodology in this regard and its achievements in technology which have attained world recognition was mentioned. It was emphasized that the work of the laboratories should be clearly defined and that it should be left to them to decide about the right mix between basic, applied and problem-oriented research.

CSIR Directors' Conference

The 18th conference of the directors of the national laboratories and industrial research associations was held on 4 and 5 July 1970 in New Delhi. Addressing the conference, Shri K. C. Pant, Minister for Scientific and Industrial Research, and Vice-President, CSIR, stressed the need for: (i) keeping abreast of the current knowledge of science and technology which was opening up new vistas, new altitudes and new horizons; (ii) making the right choice of projects with definite time targets at the right time so that our limited resources could be effectively harnessed to meet the country's needs and targets; (iii) forging an effective developmental link between research and industry, which alone can reduce the existing credibility gap; (iv) avoiding frustration of young scientists at the bench by associating and involving them in policy making and programme formulations of the laboratory; (v) inculcating a team spirit which alone can ensure speedy and effective results; and (vi) keeping the image of CSIR bright and fulfilling the expectations of the country which expects tangible economic results within a reasonable time.

Some of the important points emerging from the discussions at the conference are as follows. The establishment of a central set-up to chart out long-term projects considered essential for the industrial development of the country was found necessary; also, the research programmes of national laboratories should be oriented to increase productivity. It was also recognized that the development was an important link between research and industry and unless adequate funds were apportioned for developmental work, the know-how developed at the bench scale would not yield any results.

Science cannot flourish if there is far too much of organization and regimentation; on the other hand, it was also recognized that complete autonomy to the laboratories is also not practicable because of accountability to Parliament in respect of CSIR's functioning and spending of public funds.

An analysis of the references between CSIR and the Directorate General of Technical Development (DGTD), if undertaken, would throw up worthwhile problems for investigation by CSIR laboratories. The need to develop a much closer and intimate collaboration between CSIR and DGTD was also stressed.

Modern management techniques and streamlining of procedures and rules and regulations are essential for the research laboratories of CSIR. Difficulties of discarding dead wood in the context of the existing rules was stressed in particular. It was agreed that the Institutes of Management at Bombay and Calcutta be requested to undertake a study of the working of the CSIR headquarters and the national laboratories.

All beneficiaries in industry should be made to pay for the services rendered to them by the laboratories. Imposition of a levy on certain specified industries, which need to be identified and which may benefit from the researches carried out in CSIR laboratories, was also suggested.

Perspective planning was difficult since, under the prevalent system, hardly any problem is posed in advance and it is generally made known only at the time of submission of an application for licence; nevertheless an attempt must be made to resolve this difficulty. It may be useful to bring together the R&D organizations of the Ministry of Defence, Department of Atomic Energy, Department of Scientific & Industrial Research and Directorate General of Technical Development for this purpose and a committee appointed to work out the priority problems and to make a beginning in respect of all ministries.

Absence of any reference to technology in the Scientific Policy Resolution of the Government of India indicated its weakness. It was stressed that the gap is more in development and design rather than in research. It was, therefore, felt that research, development and design should be effectively tied up and industry should be involved in this exercise; it may also be necessary to identify research programmes with the various centres of technology in the country.

Techno-economic evaluation of projects was essential before substantial investment of funds is accepted; competent cost economists having

an understanding of scientific matters need to be associated.

It was recognized that the main weakness of the functioning of the executive councils of the laboratories was that members of the council were not directly involved in the working of the concerned laboratory.

An exercise might be undertaken to ensure that costly and imported sophisticated equipment, not required for constant use, available in research laboratories was made available to other laboratories and outside organizations so that duplication in foreign exchange expenditure is avoided.

Closer association between CSIR laboratories and universities involved movement of scientists from universities to the laboratories and *vice versa*; this involved funds for which there was no provision in the University Grants Commission's budget. The same problem arises if the laboratory wishes to farm out a project to a university. The Indian Council of Agricultural Research was stated to have some funds specially earmarked for this purpose. It was, therefore, necessary to have separate funds which could finance this activity. With regard to basic research, it was felt that the universities should be involved to a much greater extent.

Investment in funds and personnel for problems identified by the central agency must come from the available resources of the laboratory; the existing programmes may be reviewed, pruned and/or weeded out for the purpose. For multi-disciplinary projects, cooperative effort from two or more laboratories may be necessary.

Organization of an effective information service was stressed; information concerning equipment, facilities, programmes, availability of technical expertise in specific subjects and disciplines should be available to all concerned.

The need for some sort of association between CSIR and such organizations as the Botanical Survey of India, the Geological Survey of India, etc. was also pointed out.

Delay in the utilization of research results is apt to lead to frustration of working scientists. It was pointed out by some directors that the National Research Development Corporation of India has not proved to be an effective link in the transfer of technology.

Some directors of the industrial research associations emphasized the need for adequate funds; it was pointed out that the quantum of assistance from CSIR is only to the extent of 50% of its total budget. The need for greater attention to this activity by CSIR was stressed and a suggestion for the formation of a Federation of Cooperative Research Associations to effectively coordinate their activities was made.

A point was made that research in fact should be considered as a tool and to achieve a mission, particularly by the mission-oriented laboratories, any type of research—basic or applied—may have to be done. It would, therefore, be erroneous to draw any hard and fast line between the two types of researches.

The importance of team work was stressed; it was pointed out that no technology is single disciplinary and only a cooperative effort can achieve results in technological fields.

The Cabinet Secretary mentioned that a suggestion had been made to Government that some national laboratories may be handed over to the concerned user ministries. For instance, the National Metallurgical Laboratory, Jamshedpur may be attached to the Steel Ministry and the Indian Institute of Petroleum, Dehra Dun to the Ministry of Petroleum and Chemicals. A similar view has been expressed by the Administrative Reforms Commission. The Cabinet Secretary invited the views of the directors in this regard. There was considerable discussion and the directors were unanimous in their strong opposition to any proposal for the splitting up of CSIR.

PROGRESS REPORTS

NIO Annual Report: 1968-69

Compilation of charts showing the depths of occurrence of oxygen maxima and minima in the upper 500 m in the north-west Indian Ocean and the sorting of the international collections (at the Indian Ocean Biological Centre) are among the highlights of the progress of research during 1968-69 by the National Institute of Oceanography (NIO), as revealed by its annual report for the period published recently.

The data collected by various ships during the International Indian Ocean Expedition were pooled into one degree grids and analysed for getting patterns of seasonal and regional distribution. The studies reveal that there is much variation in the depths of occurrence of oxygen maxima and minima in different areas and different seasons in the north-west Indian Ocean. Along the continental shelf all over the Arabian Sea, biological activity appears to play a predominant role in controlling the oxygen content; while in the open parts of the ocean the depths of occurrence of maxima and minima appear to be governed mainly by the water movements, circulation and mixing. There exist stagnant or near-stagnant conditions in the more central parts of the Arabian Sea, restricting the exchange of water masses with the adjoining seas.

Sorting of the zooplankton samples lodged at the Indian Ocean Biological Centre at Cochin was completed, and the first and second fascicles of the Plankton Atlas of the Indian Ocean were released. The first fascicle includes charts relating to the Arabian Sea and the Bay of Bengal, and the second fascicle includes charts for the Indian Ocean as a whole.

The coastal and nearshore investigations comprising beach profiles, wave refraction patterns and nearshore current measurements taken along the Kerala coast have provided valuable information on the land-sea interaction processes involved in coastal erosion along the coast.

As part of the International Biological Programme, the productivity of Cochin backwaters is being investigated. Observations are being made on the distribution of the nutrients and chlorophyll, detritus with particular reference to the problems related to the food chain and

the regeneration of nutrients. On the basis of the average daily net production of the backwater as determined by ^{14}C assimilation, the yearly production is estimated at 124 gC/m^2. The estimated annual consumption by zooplankton herbivores as determined by the daily metabolic requirement in terms of carbon (12% of their dry weight) is only about 30 gC/m^2. This indicates that the zooplankton herbivores leave behind a large surplus of basic food in the estuary. From the general composition of the zooplankton crop, however, there seems to be no evidence to suggest that the herbivores population is largely kept at a minimum because of the presence of a large number of carnivorous forms. Laboratory experiments on the regeneration of nutrients in Cochin backwaters from the mud samples have shown that the regeneration is relatively faster in the marine zone. Regeneration is slower in brackish water areas where fresh water influx is predominant.

The Indian Ocean Biological Centre of NIO organized a workshop on Plankton Methodology during the year under review.

SITRA Annual Report 1969-70

The norms for assessing the spinning performance, evolved by the South India Textile Research Association (SITRA), Coimbatore during 1968-69, were applied successfully for evaluating individual mills during the year 1969-70. The annual report of SITRA for 1969-70, which has been published recently, reveals that as a result the individual mills can judge quickly whether they are spinning the best possible yarn from a given raw material. The project on the spinning performance was extended to evolve norms for combed as well as staple fibre yarns and with this the entire range of yarns produced at SITRA's member mills is covered. Applied research projects undertaken during the year include: (1) survey of the combing performance among member mills to establish norms for improving sliver and yarn quality for a given waste percentage, and (ii) effect of comber half lap needling on comber performance with a view to reducing the waste in combing. To understand the causes of variation in yarn the following three investigations have been undertaken: (i) long-term irregularity in sliver and roving; (ii) causes of count variation; and (iii) study of thick and thin places in yarn. The results of these investigations are expected to lead to the formulation of measures for minimizing both long-term and short-term variation in yarn quality.

In the field of machine design and instrumentation, SITRA's reel developed earlier was undergoing industrial trials. Preliminary results indicate that while the increase in production is only of the order of 5-10% over the conventional reel, there is considerable improvement in the quality of reeling. The reel is being manufactured on a commercial scale by a local manufacturer and a few units are being exported to UAR. Trials on the possibility of extending the scope of the SITRA moisture meter (intended for cotton) for measuring moisture in yarn in hank form have shown that the instrument could be used for measuring moisture content up to 16% in yarn.

Two long-term basic research projects continued during the year were: (i) mechanism of fibre rupture in tensile tests and in relation to fine structure; and (ii) exploratory investigation of the effect of taper of cotton fibres to gain basic information concerning its effect on the processing characteristics of cotton. Two new projects taken up during the year were: (i) crystallinity of Egyptian cottons; and (ii) development of stretch and novelty yarns and fabrics from cotton and cotton blends.

A significant increase in the demand on consultation services was registered during the year under report; income from consultation registered an increase of about 60% over the previous year's figures. A service started recently by SITRA is with regard to the evaluation of certain standard commercial cottons that are used by most of the member mills and the publication of fibre and spinning results for their guidance. This service will enable the mills to know the quality of cottons fairly early in the season and also their variations from season to season. The membership of SITRA increased by 12.

CSIR Library Services

Following the decision taken at the conference of the CSIR librarians held at the Indian National Scientific Documentation Centre (Insdoc), New Delhi, the centre carried out a survey of the resources and services of libraries of CSIR laboratories and of the industrial research associations. The data collected in the survey have been processed and brought out by Insdoc as a report bearing the title 'Libraries serving the CSIR complex'. The report reveals that a CSIR institution spends on an average about 4·2% of its total budget on the library, and an industrial research institution, about 8.2%. All the CSIR libraries taken together spend about Rs 31 lakhs on book budget; seven industrial research associations spend about Rs 2·80 lakhs towards books. The total stocks held by them are 5 29 238 and 42 459 volumes respectively. CSIR libraries, excluding Insdoc, receive on an average 360 periodicals. Insdoc receives the largest number of titles (3524) because of its special role to acquire and maintain periodicals collection to supplement the national collections. Besides routine circulation, loan and consultation services, specialized documentation and information services are provided by many libraries. These services include current information file, current awareness services, abstracting, translation and reprographic services. The data presented in the report (demy 4to, pages 61) relate to the year 1968-69.

Family Planning Briefs

This is the title of a new monthly periodical being published by the Indian National Scientific Documentation Centre (Insdoc), New Delhi under a grant from US AID for the Ministry of Health and Family Planning. The periodical reviews the world literature with special emphasis on Indian work concerning clinical experiences, clinical research and surveys carried out in the field of family planning. More emphasis is laid on the clinical and service aspects than on basic research. The Notes & News section of the periodical is devoted to current trends, new techniques, and progress, plans and policies of the Government in the field of family planning.

Characteristics of Solar Salt

Common salt produced by solar evaporation of sea-water and inland brines in India contains more impurities than required by IS specification for salt for chemical industries. Before processing salt to produce soda ash, caustic soda, sodium metal or refined salt, the major impurities, viz. calcium, magnesium, sulphate and insoluble matter, have to be removed practically completely by chemical treatment. With the increase in the impurity content, the number of chemicals required for removing the impurities increases and hence the cost of the final product goes up. Impurities like magnesium chloride and mangesium sulphate are hygroscopic and pose problems in handling, storage and transportation of salt.

With a view to understanding how these impurities contaminate the salt during its production in salt pans and to finding out their distributon in salt crystal or crystal aggregate, which may provide a clue for reducing or removing them, an investigation was carried by Shri M. P. Bhatt of the Central Salt & Marine Chemicals Research Institute (CSMCRI), Bhavnagar. The effect of magnesium salts on moisture absorption at various relative humidities and factors affecting the caking under controlled laboratory conditions were studied to obtain data which may help in selecting better storage conditions and predict the behaviour of salt under known climatic conditions. A knowledge of the rate of dissolution of salt is useful for salt-based industries as they consume huge quantities of common salt. Hence dissolution rates of salt samples from various regions of the country were studied and correlated with physical characteristics of salt crystals.

The association and distribution of impurities were studied with the aid of chemical, microscopic and radiotracer methods with the typical inland and sea-salt samples. Important observations from the study are as follows:

(1) Calcium sulphate impurity is present as small distinct crystals, irregularly distributed throughout the salt crystal matrix; a small amount is also present on the surface of the crystals. (2) Sea salt crystals are irregularly shaped and are porous and allow more adhering of mother liquor and thereby contain more magnesium impurity in comparison to inland salt crystals which are somewhat more regular and hard. (3) Insoluble impurities consisting of clay, sand, silica, etc., resulting from salt pans and atmospheric dust, generally exist as surface impurity, though they partly enter into irregularities and hollow spaces between the crystals. (4) Impurity contamination increases with the size of salt crystal or crystal aggregate. (5) Impurity contamination can be considerably reduced by the careful control of density between 25.4° and 29.0° Be′. (6) High purity salt containing 99.5% NaCl and very low amount of calcium sulphate can be prepared by regulating the density between 26° and 29° Be′ and controlling the size of growing crystal to 1.0-1.5 mm.

The removal of these impurities was studied by washing the salt with its saturated solution. Laboratory experiments were followed by larger scale washing experiments in screw conveyor washery and disperse column washery units. The experiments showed that 30-50% of calcium, 60-75% of magnesium, 50-60% of sulphate and 50-70% of insoluble matter can be removed in the case of sea salt by resorting to screw conveyor washing.

Screw conveyor washing was not effective in the case of Kharaghoda salt (inland salt). The salt sample was ground to 1 mm size to liberate calcium sulphate and insoluble matter and was subsequently washed in disperse washing column, which was specially designed and fabricated. By washing the ground Kharaghoda salt in this unit salt conforming nearly to IS specification for salt for chemical industry was obtained, while with ground sea salt, high purity salt (99.5% NaCl) was obtained.

The cost of washing the salt in screw conveyor and disperse washing column (120 tonnes/day capacity plant) works out to Rs 3.5 and Rs 4.5 per tonne respectively.

Moisture absorption by synthetic salt samples containing either magnesium chloride and magnesium sulphate alone or both in the proportions present in common salt has been studied. The main conclusions of the study are as follows. (1) Moisture absorption is directly proportional to the impurity content. (2) Salt samples containing magnesium chloride adsorb more moisture and at higher rates compared to those containing magnesium sulphate in similar proportions. (3) At 50, 60 and 70% relative humidities mostly all samples attain the equilibrium with respect to moisture within 48 hr of exposure. (4) At 80 and 90% relative humidities sodium chloride becomes active and rates of moisture adsorption are 1.5 and 4.0 of H_2O per 100 g of salt respectively. (5) Moisture absorption is proportional to magnesium chloride and magnesium sulphate content in salt samples containing both these impurities together and agree with values calculated by empirical equations derived from the above results. (6) For the determination of moisture absorption by unknown samples, empirical methods of calculations independent of experiments give an accuracy of $\pm 5\%$.

The effect of various factors like moisture content, impurity proportion pressure, particle size, relative humidity, temperature and anti-caking agents was quantitatively determined by devising a mechanical moulding of salt under controlled conditions followed by drying and measuring the compression strength of the resulting block of salt. These results showed that caking of salt is directly proportional to the initial moisture content, pressure and temperature. Increase in the relative humidity or impurities like magnesium chloride reduces the caking proportionately. Caking increases with the decrease in particle size and logarithmic relation exists between particle size and caking. Among the fine powders used to prepare free flow salt, calcium silicate has a better anti-caking property, while sodium ferrocyanide in proportions as small as 5 to 10 ppm reduces the caking to the extent of 70%.

Comparative rates of dissolution of Kharaghoda, Bhavnagar, Porbandar, Tuticorin and Orissa salt samples were determined by batch and continuous methods. These were correlated with bulk density,

particle size and hardness of respective salt samples. The results indicate that sea-salt samples having similar bulk density and broadly similar particle size ranges dissolved at similar rates, while inland salt (Kharaghoda) having high bulk density, greater hardness and coarser size range, take from one-and-half times to two times the period to dissolve the same quantity under identical conditions.

Shri M. P. Bhatt, who carried out the investigations under the guidance of Dr D. S. Datar, Director of CSMCRI, was awarded the Ph.D. degree of the Gujarat University (1970) for his thesis based on the study.

Peroxidization of Tissue Lipids and their Role in Metabolic Disorders

The formation of lipid peroxides in tissues due to the auto-oxidation of the unsaturated lipids of cellular constituents has been implicated in the pathology of metabolic disorders such as muscular dystrophy or arteriosclerosis. Injury to tissues is assumed to be the modus by which lipid peroxides leads to metabolic disturbances. The precise chemical mechanism by which such injury takes place is not known.

The extensive lipid peroxidation that occurs when tissue homogenates are incubated under *in vitro* conditions offers a convenient system and a model for the study of the mechanism of formation of lipid peroxides. As a result of investigations in progress since 1960 at the Central Drug Research Institute (CDRI), Lucknow using tissue homogenates of rat, guinea-pig and rabbit, it has been shown that the substrates which undergo peroxidation are located in the particulate or organelle structures of the cell, whereas the catalyst which brings about the oxidation is present in the soluble part of the cytoplasm. The peroxidization mediated by the pro-oxidant factor is non-enzymic in nature and is distinguishable from similar peroxidizations brought about by ferric ions, ascorbic acid or cysteine. The pro-oxidant factor is thermostable and of a low molecular weight. The chemical nature of this factor is currently under investigation.

During the course of this work the powerful anti-oxidant action of rutin, the rhamnoside of hesperidin, on this system was discovered and this finding enabled a detailed study of the role of lipid peroxidation on the denaturation of enzymes in tissues. The results indicate that peroxidization and the consequent release of peroxides (free radicals) are possibly involved in membrane damage leading to either inactivation of particulate bound enzymes or their release into the cytosol fraction.

Shri S. K. Sharma of CDRI, Lucknow, who worked on the above project under the supervision of Dr C. R. Krishna Murti of the institute, was awarded the Ph.D. degree (1970) by the Lucknow University for his thesis relating to the work.

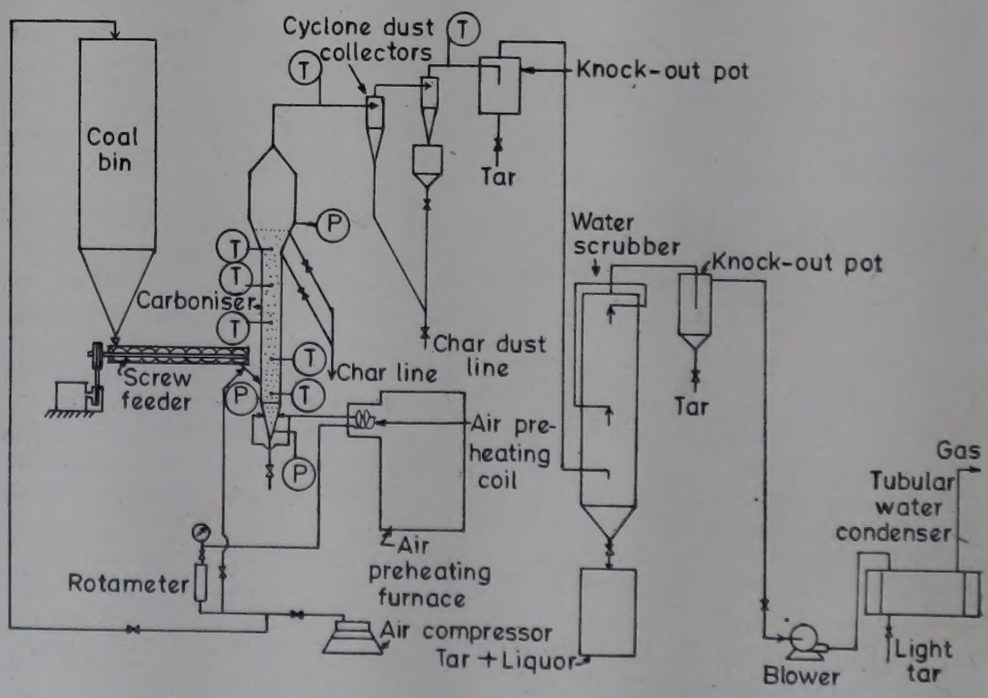
Continuous Carbonization of Coal Slack in Fluidized Bed

Nearly 35% of mined coal is in the form of powder of less than 20 mm size. This fine material, known as slack, has limited demand and its accumulation and disposal at pit heads pose serious problems to the collieries. The Singareni Collieries Co. Ltd, who annually mine about 4 million tonnes of low-grade, high-ash and non-caking coals (swelling number = zero) in Kothagudem and Ramagundam areas of Andhra Pradesh, have sponsored a project at the Regional Research Laboratory, Hyderabad to explore the possibility of converting the slack coal into a suitable domestic fuel.

An experimental unit (capacity, 1 tonne/day) has been designed, fabricated, erected and operated at the laboratory for continuous carbonization of powdery coal in a fluidized bed for production of char (semicoke). This char is briquetted with tar and the briquettes produced have been found to be a satisfactory smokeless domestic fuel.

The plant consists of a coal hopper with conveying system fitted with a variable drive, an air compressor and a furnace for injecting the pre-heated air as a fluidizing gas, dust collecting system, equipment for the cooling and condensation of tar and gas, etc.

Crushed coal of 0·53 mm average size is fed to the 23 cm int. diam. fluidized-bed carbonizer (aspect ratio, 6) at one foot above the gas distributor. Preheated air at a temperature of 300-400°C is injected through a conical perforated distribution grid



Ⓣ Temperature measurement point; Ⓟ Pressure measurement point

Flow diagram of fluidized-bed carbonization pilot plant

having an angle of repose more than 60°. Carbonization is effected by partial combustion of a small quantity of coal, the heat liberated being sufficient to maintain the temperatures at 400-650°C. The coarse char is continuously withdrawn through the overflow pipe and collected in a char receiver. Fine char separated in cyclones from the gas is collected in a separate receiver. The gas is condensed and the tar is collected partly in the scrubber and knock-out pot and the rest in tubular cooler.

BTRA Develops Elcofil Sorter

For the rapid measurement of cotton fibre length, the Bombay Textile Research Association (BTRA), Bombay has developed an instrument, known as ELCOFIL (ELectronic COtton FIbre Length) sorter based on dielectric capacitance principle. It gives nearly the same parameters as the comb sorter in a short time.

The instrument consists of a scanning capacitor, amplifier system, an indicating meter, a computing unit and a specimen driving mechanism. Three stages are involved, as in other instruments, in the estimation of fibre length by this instrument: (i) specimen preparation; (ii) testing the specimen; and (iii) evaluation of length parameters.

Specimen preparation

A sliver is prepared from a representative sample. Placing it on a bed of combs, the end of the sliver is 'squared' by removing the tuft of fibres till a staple length equivalent of sliver is discarded. Five small tufts are drawn from this 'squared' end successively and laid one over the other to form a test specimen of parallel fibres aligned at one end. The aligned end of the specimen is welded between two polythene strips by heat sealing to a depth of 3 mm. The specimen is now ready for being tested.

Specimen testing

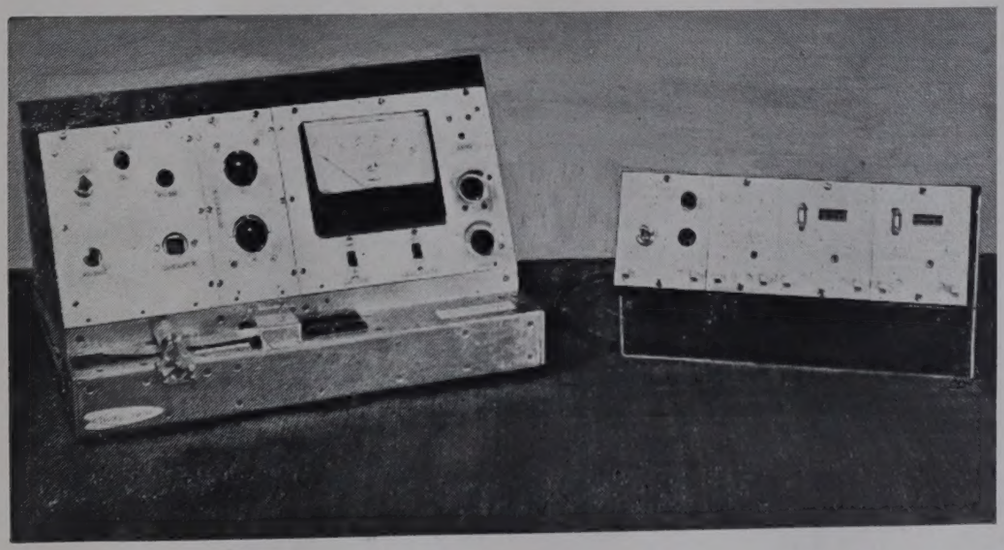
The tuft can be scanned in steps or continuously by the tuft driving mechanism. When scanned in steps of 3 mm, the meter (calibrated in % distribution) indicates the percentage of fibres relative to the number of fibres at the base of the tuft. By plotting the meter readings against specimen length, a frequency distribution curve similar to the comb sorter diagram is obtained from which the mean length, effective length and short fibre percentage can be evaluated with the same geometric constructions.

When scanned continuously, the computing unit computes the 20% distribution and 60% distribution lengths of the specimen. These lengths are equivalent to the effective length and mean length respectively. The specimen is scanned a second time till the specimen moves through half the 20% distribution length obtained in the first run and the meter indicates short fibre percentage on the lower scale.

Since the ELCOFIL sorter and the comb sorter diagrams are similar, a comparative study was made on many cottons using these two methods. A number of cottons was tested with this instrument and the results were found to be in good agreement with those obtained with the comb sorter method.

The ELCOFIL sorter thus provides a rapid method for estimating the familiar length parameters of the comb sorter. The instrument gives reproducible results and is suitable for routine testing of cotton as well as man-made staple fibres, and wool.

Fabricated with only indigenous components the ELCOFIL sorter is cheaper than the digital fibrograph.



Electronic cotton fibre length (Elcofil) sorter and computing unit, designed and developed by BTRA, Bombay, for the rapid measurement of cotton fibre length

Patents Accepted

Indian Pat. 110331

Improvements in and relating to the preparation of ion-exchange membranes of the heterogeneous type

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CSMCRI, Bhavnagar

Electrodialysis using synthetic ion-exchange membranes has found varied applications such as water desalting, concentration, separation, preparation and recovery of chemicals, etc. In this invention sheets of cation- and anion-exchange membranes containing the binder used in different proportions have been prepared using indigenously available ion-exchange resins and binders such as rubber and rubber-like polymers. The sheets of membrane possess good physical and chemical properties and are capable of being stored dry at room temperature without the necessity of moistening. The urgent problem of converting potable or industrial water from brackish water sources can be successfully tackled by employing the membranes in electrodialysis treatment cells.

Indian Pat. 118033

A new process for the production of domestic fuel from coal

M. S. Iyengar, R. K. Chakrabarti, R. Haque, M. L. Dutta & J. Burgohain

RRL, Jorhat

Domestic fuels from coal are usually obtained by various conventional processes of low and high temperature carbonization, briquetting of coal fines or by stack burning of lump coals. The process developed at the Regional Research Laboratory,

Jorhat differs from the existing processes of making domestic fuel in that the carbonization step is eliminated. The process will be highly suitable for making domestic fuel from highly volatile, vitrain-rich caking coals especially those from the coalfields of Assam. This process will make good use of the fines produced in the collieries, the amount of which will gradually increase with the increased mechanization of the mines. The process is simple and consists of mixing finely crushed coal with a suitable proportion of a binder and nodulizing the mixture, curing the nodules for sufficient time to impart strength, and drying before being marketed. There will be no agglomeration of the nodules on the grate and consequently the duration and intensity of smoke emission are considerably reduced compared with those of coals, and the product gives brilliant combustion after giving a little smoke initially.

The sulphur dioxide content of the combustion gases (from high sulphur coals) is low, the product is strong enough to withstand handling and transportation and is weather resistant. The product is cheap and process involves low initial cost for installation.

Indian Pat. 112777

Process for the recovery of potassium salts from molasses distillery spent wash liquor using ion-exchange technique

H. M. Bhavnagary, R. Ramaswamy & N. Krishnaswamy

CSMCRI, Bhavnagar

As India does not have any potash deposits, the requirement of potassium chemicals is being met mainly by imports. Spent wash liquor from distilleries contains substantial amounts of potassium and calcium salts besides organic colouring matter. There are about 70 distilleries in India which discharge about 900 million gallons of spent wash annually. If all the spent wash that is being disposed off as waste is used for recovery of potash, about 45 000 tons of potassium chloride can be recovered annually.

A process has been worked out for recovering potassium chloride from the spent wash using ion-exchange technique. The principle involves the adsorption of potassium and other cations on a cation exchanger operating on the sodium cycle and later elution with brine solution. The potassium salt is recovered by evaporation of the eluate. The strong acid cation exchanger used in the process is available in the country. The equipment needed for the process include pressure filter, ion-exchange column, evaporator, crystallizer and centrifuge and these can be fabricated indigenously.

PATENTS SEALED

110440: Oxygen depolarized primary wet cells, M. A. V. Devanathan, V. Aravamuthan, N. Ramasamy & S. Venkatesan—CECRI, Karaikudi.

110441: Process for the manufacture of high purity common salt by solar evaporation of brines, G. C. Jain, J. M. Patel, R. M. Bhatt, R. B. Bhatt & D. S. Datar—CSMCRI, Bhavnagar.

111213: A nodulizer, M. S. Iyengar, S. Dutta, U. Chowdhury & B. C. Jana—RRL, Jorhat.

111247: Improvements in or relating to photo-sensitive thin films of thallium selenide layers, C. V. Suryanarayana, N. Rangarajan, K. N. Rao & M. J. Mangalam —CECRI, Karaikdui.

111691: Improvements in or relating to the electrochemical marking on metals, S. Guruswamy & G. P. Rao—CECRI, Karaikudi.

111958: A filament winding machine for the fabrication of filament-wound fibreglass reinforced cylinders, V. G. Krishna, H. S. P. Sastry & Mohd J. Mohiadin—NAL, Bangalore.

112036: Improved surface coating materials from cashewnut shellliquid, S. N. Agarwal, B. G. Murthy, M. A. Sivasamban & J. S. Aggarwal—RRL, Hyderabad.

112037: Construction of a rotating cantilever type fatigue testing machine, Shivaramiah & Ningiah—NAL, Bangalore.

112106: Improvements in or relating to electroplating of chromium from aqueous electrolytes, N. V. Parthasaradhy & T. R. Subramannian—CECRI, Karaikudi.

112185: Improvements in or relating to flywheel synchronization circuits for TV receivers, S. K. Goyal & L. Singh—CEERI, Pilani.

Recent Advances in Heterocyclic Chemistry

Seminar at NCL

A seminar on 'Recent advances in heterocyclic chemistry' is being organized by the National Chemical Laboratory (NCL), Poona on 7 and 8 September 1970. Fourteen leading scientists in this field from all over the country are expected to present papers in the synthetic and physical organic aspects of the chemistry of heterocyclic compounds.

Plenary sessions devoted to the trends and perspective programmes in this field are also being organized. Scientists interested in the field are invited to attend the seminar.

Insdoc Training Course in Documentation & Reprography

The following candidates have been declared successful in the examination conducted during 1968-69. The sponsor is mentioned in parentheses.

Distinction

Murthy, D. S. R. (Insdoc, New Delhi); Rao, C. R. S. (CSIR, New Delhi); Deshpande, D. V. (private); Hemalata Balakrishnan (private); and Kesharwani, S. K. (CPHERI, Nagpur).

Second Division

Sinha, P. K. (Insdoc, New Delhi); Kusuma, V. N. (Insdoc, New Delhi); Ratnakar, R. (private); Vedapuri, V. K. (I.I.T., Madras); Mitra, A. C. (CMRS, Dhanbad); Chokkaiyan, R. (CECRI, Karaikudi); Patnaik, E. H. (NGRI, Hyderabad); Agarwal, M. M. (RRL, Hyderabad); and Moitra, S. (ICAR, New Delhi).

112207: Improvements in or reating to open-web steel sections for structural use, K. V. Shetty—CMERI, Durgapur.

112301: Emulsion paint vehicles from styrenated copolymers of drying and semi-drying oils, P. Narasimham, M. Yaseen & J. S. Aggarwal —RRL, Hyderabad.

112487: Improvements in or relating to the production of electrolytic calcium metal, V. Aravamuthan, K. Venugopalan & T. P. Madhavan —CECRI, Karaikudi.

112574: A simple process for preheating the air blast in cupola, J. Mohan & A. B. Chatterjea—NML, Jamshedpur.

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